

WHAT IS CLAIMED IS:

1. A wavelength tunable semiconductor laser, comprising:
 - a SG-DFB structure portion including a gain area for generating an optical wave and a phase control area, the gain area having a sampled diffraction grating of a first period;
 - a SG-DBR structure portion being integrated with the SG-DFB structure portion and including a SG-DBR area having a sampled diffraction grating of a second period; and
 - a non-reflection thin film being provided on one end surface of each of the SG-DFB structure portion and the SG-DBR structure portion,
 - wherein an oscillated wavelength is tuned in accordance with change of refraction indexes of the phase control area and/or the SG-DBR area.
2. A wavelength tunable semiconductor laser according to claim 1, wherein the sampled diffraction grating of the first period and the sampled diffraction grating of the second period have the same pitches.
3. A wavelength tunable semiconductor laser according to claim 1, wherein the refraction indexes of the phase control area and the SG-DBR area are changed with applying current.
4. A wavelength tunable semiconductor laser according to claim 1, wherein the oscillated wavelength is continuously or discontinuously tuned.

5. A wavelength tunable semiconductor laser according to claim 1, wherein the wavelength tunable semiconductor laser and an optical modulator are integrated in one semiconductor substrate.

6. A wavelength tunable semiconductor laser, comprising:
a substrate of a lower cladding layer;
a gain area, a phase control area and a SG-DBR area which are composed of different wave guide layers on the substrate;
an upper cladding layer being formed over the whole structure;
electrodes for independently applying voltages to a lower portion of the substrate, the gain area, the phase control area and the SG-DBR area; and
a non-reflection thin film being formed on each end surface,
wherein the gain area and phase control area, having a sampled diffraction grating of a first period, constitute the SG-DFB structure portion, and the SG-DBR area, having a sampled diffraction grating of a second period, constitute the SG-DBR structure portion; and
wherein an oscillated wavelength is continuously or discontinuously tuned in accordance with change of refraction indexes caused by applying current to the phase control area and/or the SG-DBR area through the electrodes.

7. A wavelength tunable semiconductor laser according to claim 6, wherein the sampled diffraction grating of the first period and the sampled

diffraction grating of the second period have the same pitches, and the first period and the second period are different.

8. A wavelength tunable semiconductor laser according to claim 6, wherein the substrate is an n type InP substrate, the wave guide layers are composed of an InGaAsP group material, and the upper cladding layer is a p type InP layer.